

ENGINEERING GRAPHICS - II

Subject Code :

No. of Credits : 3 (TH:4,T:0,P:1)

I. RATIONALE :

Engineering drawing lays the foundation for visualizing the situation and delivering the essential instructions, required to carry out engineering jobs. This course aims at developing the ability to read and draw projection of lines, planes, solids. It also aims at reading and drawing the sections of the orthographic views. Engineering drawing also intends to develop the ability to visualize and draw curves of intersection and develop lateral surfaces of various solids.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME :

Use different drawing instruments for solving broad based engineering problems.

III. COURSE LEVEL LEARNING OUTCOMES (COS) :

Students will be able to achieve & demonstrate the following COs on completion of course based learning:

CO1 - Projection of Section of solids.

CO2 - Lateral development of surface of solids.

CO3 - Draw Different types of threads.

CO4 - Draw different nuts.

CO5 - Different, bolt and their assembly.

CO6 - Different types of screw.

CO7 - Free hand sketching.

CO8 - Practice on Auto CAD software.

IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Sr. No	Theory Learning Outcomes (TLOs) aligned to COs	Learning content mapped with Theory Learning Outcomes (TLOs) and COs.	Suggested Learning Pedagogies.	No of Lecture	CO
1	<p>TLO 1.1 Draw different types of sectional views of solid.</p> <p>TLO 1.2 Draw sectioning and hatching conventions.</p> <p>TLO 1.3 Develop sectional orthographic views from the pictorial views of given object.</p> <p>TLO 1.4 Interpret the given drawing.</p>	<p>UNIT - I Introduction of Section of Solids</p> <p>1.1 Introduction of section of solid.</p> <p>1.2 Hatching –BIS Conventions.</p> <p>1.3 Section of Prisms and Cubes.</p> <p>1.4 Section of Pyramids and Tetrahedrons.</p> <p>1.5 Section of Cylinders.</p> <p>1.6 Section of Cone.</p> <p>1.7 Section of Spheres.</p> <p>1.8 Section of Combinations of Solids.</p> <p>1.9 Section of Truncated or Frustum Solid.</p> <p>1.10 Sectional views & Conventions of Materials and Steel Sections. (03sheets)</p>	Demonstration	14	CO1
2	<p>TLO 2.1 Draw development of lateral surfaces of the given solid.</p> <p>TLO 2.2 Identify parts where concept of development of the given surfaces is required.</p> <p>TLO 2.3 Draw development of given sheet metal.</p>	<p>UNIT - II Development of Surfaces</p> <p>2.1 Method of development of Lateral surface.</p> <p>2.2 Development of Cubes.</p> <p>2.3 Development of Prism and Cylinder.</p> <p>2.4 Development of Truncated Prism and Cylinders.</p> <p>2.5 Development of Pyramids and Cones.</p> <p>2.6 Development of Frustum or Truncated Pyramids and Cones and their Application Such as Tray, Funnel, Chimney, Pipe Bends etc. (03sheets)</p>	Model Demonstration and Video Demonstrations	14	CO 2

3	<p>TLO 3.1 Identification of threads, Nomenclature.</p> <p>TLO 3.2 Formation of thread as per BIS.</p> <p>TLO 3.3 Draw Multiple Thread.</p>	<p>UNIT - III Threads</p> <p>3.1 Nomenclature of threads.</p> <p>3.2 Types of threads.</p> <p>3.3 Forms of various external thread.</p> <p>3.4 Sections such as V, Square and Acme threads, BA, BSW and Knuckle, Metric, Seller Thread, Buttress Threads, Simplified conventions of left hand and right hand threads, both external and internal threads, Single start, double start and multiple start threads.</p>	Model Demonstration	6	CO3
4	<p>TLO 4.1 Identification of Nuts and Bolts, Nomenclature.</p> <p>TLO 4.2 Formation of Nuts and Bolts,</p> <p>TLO 4.3 Draw Locking Devices.</p>	<p>UNIT - IV Nuts and Bolts</p> <p>4.1 Different views of hexagonal and square nuts; Assembly of hexagonal headed, square headed, square headed with square neck, bolts with hexagonal and square nuts and washers.</p> <p>4.2 drawing practice of different types of nuts, bolts, washers and in assembly.</p> <p>4.3 Locking Devices -Lock nut, castle nut, split pin nut, sawn nut, slotted nut.</p>	Model Demonstration	4	CO4
5	<p>TLO 5.1 Identification of Screw, Studs, Washers, Nomenclature.</p> <p>TLO 5.2 Formation of set Screw, Studs, Washers.</p>	<p>UNIT - V Screws, Studs, Washers</p> <p>5.1 Understanding the uses of screws and Drawing practice of various types of machine screws.</p> <p>5.2 Drawing various types of studs and set screws, drawing various type of wooden screws.</p>	Demonstration	10	CO5
6	<p>TLO 6.1 Identification of keys and types of keys and application.</p>	<p>UNIT - VI Key and Cotters</p> <p>6.1 Various types of keys and cotters and their practical</p>	Demonstration	6	CO6

	<p>TLO 6.2 Identification of cotter and drawing practice of cotter assembly.</p>	<p>application and Preparation of drawing of various keys and cotters showing keys and Cotters in position.</p> <p>6.2 Cotter joints</p> <p>(i) Gib and Cotter Joint</p> <p>(ii) Knuckle Joint</p>			
7	<p>TLO 7.1 Drawing practice of different types of screws.</p> <p>TLO 7.2 Drawing practice of different types of Studs.</p> <p>TLO 7.3 Drawing practice of different types of Washers.</p> <p>TLO 7.4 Drawing practice of different types of Rivets and Riveted Joints.</p> <p>TLO 7.5 Muff or Box coupling, half lap muff coupling drawing practice.</p>	<p>UNIT – VII Free hand sketching</p> <p>7.1 Introduction of Screws, Studs, Washers, Rivets and Riveted Joints and their drawing practice.</p> <p>7.2 Types of structural and general purposes rivet heads.</p> <p>7.3 Caulking and fullering of riveted joints.</p> <p>7.4 Types of riveted joints – lap, butt (single riveted, double riveted lap joint, single cover plate and double cover plate), chain and zig – zag riveting.</p> <p>7.5 Muff or Box coupling, half lap muff coupling.</p>	Demonstration	14	CO7
8	<p>TLO 8.1 Drawing practice of different orthographical views object problem.</p> <p>TLO 8.2 USE CAD software to make 3D views of a machine part.</p>	<p>UNIT – VII Basic Auto CAD</p> <p>8.1 Familiarization with CAD software and it's tool. Understanding basic and necessary command to make an object 3D view/isometric view on system.</p> <p>8.2 Draw different drawing of solids on system, using CAD software. Like-nut and bolt assembly. washer, riveted joint, sleeve and cotter joint etc.</p>	Demonstration	12	CO8

V. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING):

ASSIGNMENT

1. Projection of Section of solids.
2. Lateral development of surface of solids.
3. Draw Different types of threads.
4. Draw different nuts, bolt and their assembly.
5. Different types of screw, studs.
6. Free hand sketching.
7. Practice on Auto CAD software Projection of Lines.

MICRO PROJECT

Student should collect fabricated job/ component nearby workshop/ industries and try to show curves of intersections for different solid surfaces. Each student will assess at least one sheet of other students (May be a group of 4 students identified by teacher can be taken) and will note down the mistakes committed by them. Student will also guide the students for correcting the mistakes, if any.

Students should collect component, job/sample from nearby workshops/industries and try to show the development of lateral surfaces of that. Each student should explain at least one problem for construction and method of drawing in sheet. Teacher will assign the problem of a particular sheet to be explained to each student.

VI. INSTRUMENTS / TOOLS / SOFTWARE REQUIRED :

Sr. No.	Equipment Name with Broad Specification	Relevance LLO Number
1	Drawing Table with Drawing Board of Full Imperial/ A1 size.	All
2	Models of objects for sectional orthographic.	1,2
3	Models/ Charts/ animated video of objects mentioned in unit no.2.	3,4,5
4	Models/ Charts / animated video of projections of different solids.	6,7,8
5	Models/ Charts / animated video of intersections of various solids.	9,10,11
6	Models/ Charts / animated video of development of lateral surfaces of various solids. Computer system with auto CAD.	12,13,14,15,16
7	Set of various industrial drawings being used by industries.	All
8	Drawing equipment and instruments for class room teaching-large size: T-square or drafter (Drafting Machine). Set squares (45° and 30°-60°) Protractor. Drawing instrument box (containing set of compasses and dividers). Drawing sheets, Drawing pencils, Eraser, Drawing pins / clips.	All

VII. SUGGEST WEIGHTAGE TO LEARNING EFFORTS AND ASSESSMENT PURPOSE (SPECIFICATION TABLE):

Sr. No.	Unit	Unit Title	Aligned COs	Learning Hours (L+T)	Weightage %
1	I	Section of solids.	CO1	14	18
2	II	Development of surface.	CO2	14	18
3	III	Different types of threads	CO3	6	8
4	IV	Types of nuts.	CO4	4	6
5	V	Nut, bolt and their assembly	CO5	10	8
6	VI	Screw and studs	CO6	6	8
7	VII	Free hand sketching.	CO7	14	18
8	VIII	Uses of Auto CAD.	CO8	12	16
Grand Total				80	100

VIII. SUGGESTED COS - POS MATRIX FORM:

Course Outcomes (COs)	Programme Outcomes (POs)						
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life long Learning
CO1	3	3	2	-	-	2	2
CO2	3	3	2	-	-	2	2
CO3	3	3	2	-	-	2	2
CO4	3	3	2	-	-	2	2
CO5	3	3	2	-	-	2	2
CO6	3	3	2	-	-	2	2
CO7	3	3	2	-	-	2	2
CO8	3	3	2	3	-	2	2
Legends: - High:03, Medium:02, Low:01							

IX. SUGGESTED-LEARNING MATERIALS / BOOKS:

Sr. No.	Author	Title	Publisher with ISBN Number
1	Bureau of Indian Standards.	Engineering Drawing Practice for Schools & Colleges IS: SP-46	Third Reprint, October 1998 ISBN No. 81- 7061-091-2
2	Bhatt N. D.	Engineering Drawing	Charotar Publishing House, 2010 ISBN No. 978-93-80358-17-8
3	Bhatt N.D.; Panchal V.M	Machine Drawing	Charotar Publishing House, 2010 ISBN No. 978-93-80358-11-6
4	Jolhe D.A.	Engineering Drawing	Tata McGraw Hill Edu. New Delhi, 2010, ISBN No. 978-0-07-064837-1
5	Dhawan R.K.	Engineering Drawing	S. Chand and Company New Delhi, ISBN No. 81-219-1431-0
6	Agrawal Basant, Agrawal C.M.	Engineering drawing	McGraw Hill Education, New Delhi, ISBN No. 978-1259062889
7	Narayana, K.L., Kannaiah. P.	Engineering Drawing	Scitech Publications India, Chennai ISBN No-978-8183714433
8	Singhanian Nitin	Indian Art and Culture	McGraw Hill, ISBN No-978-9354601804

X. LEARNING WEBSITES & PORTALS:

Sr. No.	Link / Portal	Description
1	https://youtu.be/3VWnhRCF_0M	Sectional Orthographics
2	https://youtu.be/3WXPanCq9LI	Projection of lines
3	https://youtu.be/44glqyyw7OM	Projection of Plane
4	https://youtu.be/RE_ZG_SSsV8	Projection of solids
5	https://youtu.be/gIRsXiTKfDo	Projection of solids
6	https://youtu.be/q4uZYDtO05s	Projection of solids
7	https://youtu.be/rerGFp3V6W8	Intersection of solids
8	https://youtu.be/40pvNA0_sNM	Intersection of solids
9	https://youtu.be/P5oPrynRsTI	Development of lateral surfaces
10	https://youtu.be/vqk7SnpDQvg	Development of lateral surfaces
